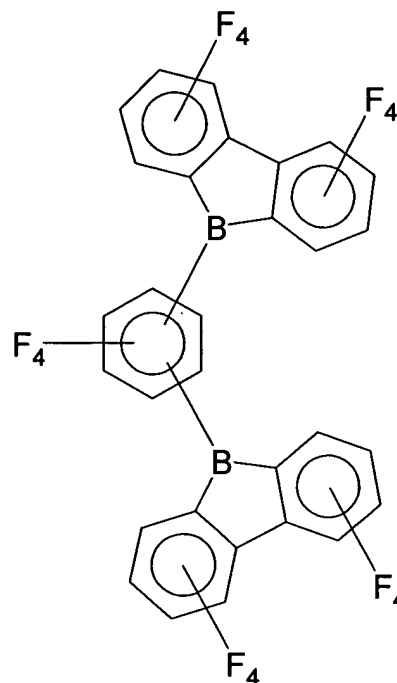


CLAIMS

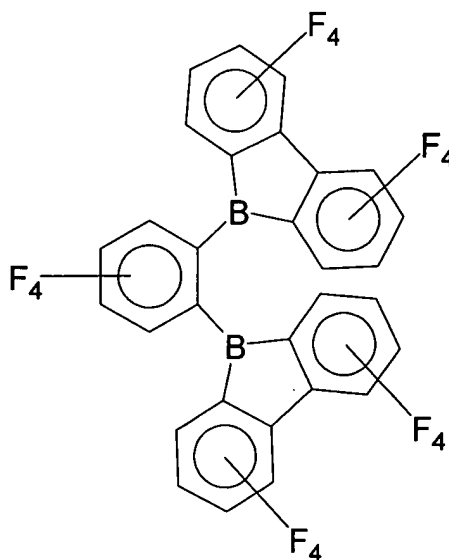
What is claimed is.

1. A method for cationically polymerizing olefin monomer comprising the step of using a composition having the chemical structure:



as a coinitiator in an organic phase or a neat monomer reaction phase.

2. The method of claim 1, wherein the chemical structure is:



3. The method of claim 1, wherein the olefin monomer is selected from the group consisting of:
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene,
dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-
butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.
4. The method of claim 1, wherein the olefin monomer is a C₂-C₃₀ olefin or a C₂-C₃₀ diolefin.
5. The method of claim 1, wherein the olefin monomer is isobutene.
6. The method of claim 1, wherein the organic phase is a hydrocarbon solution of the monomer or a
halogenated-hydrocarbon solution of the monomer.
7. The method of claim 1, wherein the neat-monomer reaction phase is a liquid monomer.
8. A method for cationically polymerizing olefin monomer comprising the step of using a composition
having the chemical structure:



as a coinitiator in an organic phase or a neat monomer reaction phase;

wherein each R is independently selected from the group consisting of a perfluorophenyl; 3,5-bis(trifluoromethyl)phenyl; 1-perfluoronaphthyl; 2-perfluoronaphthyl; 2-perfluorobiphenyl; 3-perfluorobiphenyl; 4-perfluorobiphenyl; and *p*-R''₃Si-2,3,5,6-tetrafluorophenyl;

wherein R' is 1,2-perfluorophenylene; 1,2-perfluoronaphthalene; 2,3-perfluoronaphthalene; 1,8-perfluoronaphthalene; 1,2-perfluoroanthracene; 2,3-perfluoroanthracene; 1,9-perfluoroanthracene; 1,2-perfluorophenanthrene; 2,3-perfluorophenanthrene; 1,10-perfluorophenanthrene; 9,10-perfluorophenanthrene; 2,2'-perfluorobiphenylene; 2,2'-perfluoro-1,1'-binaphthalene; 3,3'-perfluoro-2,2'-binaphthalene; or 1,1'-ferrocene; and

wherein R' is a C₁, C₂, C₃, C₄, C₅, C₆, C₇, C₈, C₉, or C₁₀ alkyl.

9. The method of claim 8, wherein the olefin monomer is selected from the group consisting of:
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene,
5 dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-
pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

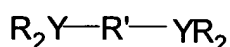
10. The method of claim 8, wherein the olefin monomer is a C₂-C₃₀ olefin or a C₂-C₃₀ diolefin.

10 11. The method of claim 8, wherein the olefin monomer is isobutene.

12. The method of claim 8, wherein the organic phase is a hydrocarbon solution of the monomer or a
halogenated-hydrocarbon solution of the monomer.

15 13. The method of claim 8, wherein the neat monomer reaction phase is a liquid monomer.

14. A method for cationically polymerizing olefin monomer comprising the step of using a composition
having the chemical structure:



20 as a coinitiator in an organic phase or neat monomer reaction phase;

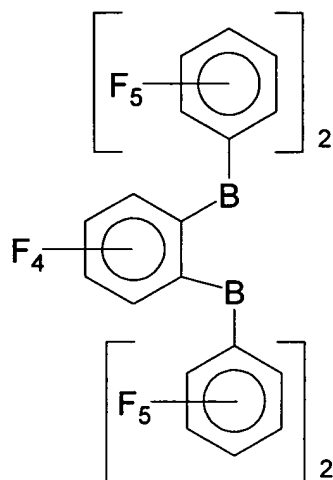
wherein Y is boron or aluminum;

wherein each R is independently selected from the group consisting of a perfluorophenyl; 3,5-
bis(trifluoromethyl)phenyl; 1-perfluoronaphthyl; 2-perfluoronaphthyl; 2-perfluorobiphenyl; 3-
25 perfluorobiphenyl; 4-perfluorobiphenyl; and *p*-R'₃Si-2,3,5,6-tetrafluorophenyl;

wherein R' is 1,2-perfluorophenylene; 1,2-perfluoronaphthalene; 2,3-perfluoronaphthalene;
1,8-perfluoronaphthalene; 1,2-perfluoroanthracene; 2,3-perfluoroanthracene; 1,9-
perfluoroanthracene; 1,2-perfluorophenanthrene; 2,3-perfluorophenanthrene; 1,10-

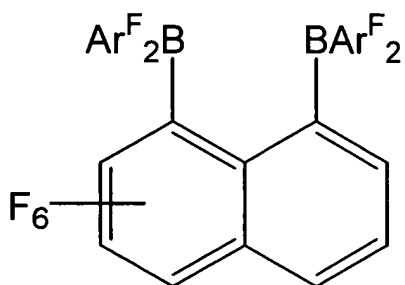
perfluorophenanthrenyl; 9,10-perfluorophenanthrenyl; 2,2'-perfluorobiphenylenyl; 2,2'-perfluoro-1,1'-binaphthalenyl; 3,3'-perfluoro-2,2'-binaphthalenyl; or 1,1'-ferrocenyl; and
wherein R'' is a C₁, C₂, C₃, C₄, C₅, C₆, C₇, C₈, C₉, or C₁₀ alkyl.

- 5 15. The method of claim 14, wherein the chemical structure is:



- 10 15 15. The method of claim 14, wherein the olefin monomer is selected from the group consisting of: ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.
- 20 17. The method of claim 14, wherein the olefin monomer is a C₂-C₃₀ olefin or a C₂-C₃₀ diolefin.
18. The method of claim 14, wherein the olefin monomer is isobutene.
- 25 19. The method of claim 14, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.

20. The method of claim 14, wherein the neat-monomer reaction phase is a liquid monomer.
21. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:

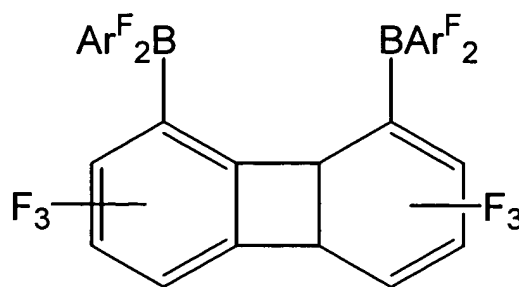


wherein $\text{Ar}^{\text{F}} = \text{C}_6\text{F}_5$ or $\text{Ar}_2^{\text{F}} = \text{C}_{12}\text{F}_8$

as a coinitiator in an organic phase or neat monomer reaction phase.

22. The method of claim 21, wherein the olefin monomer is selected from the group consisting of:
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene,
dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-
butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.
23. The method of claim 21, wherein the olefin monomer is a $\text{C}_2\text{-C}_{30}$ olefin or a $\text{C}_2\text{-C}_{30}$ diolefin.
24. The method of claim 21, wherein the olefin monomer is isobutene.
25. The method of claim 21, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.

26. The method of claim 21, wherein the neat-monomer reaction phase is a liquid monomer.
27. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:

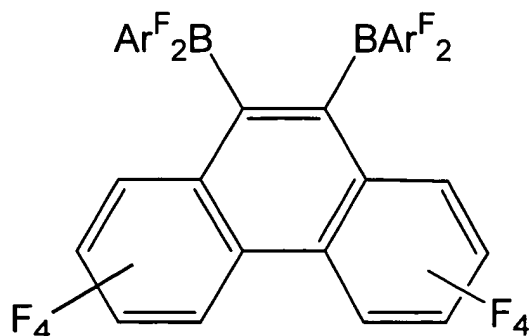


wherein $\text{Ar}^{\text{F}} = \text{C}_6\text{F}_5$ or $\text{Ar}^{\text{F}}_2 = \text{C}_{12}\text{F}_8$

as a coinitiator in an organic phase or neat monomer reaction phase.

28. The method of claim 27, wherein the olefin monomer is selected from the group consisting of: ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.
29. The method of claim 27, wherein the olefin monomer is a $\text{C}_2\text{-C}_{30}$ olefin or a $\text{C}_2\text{-C}_{30}$ diolefin.
30. The method of claim 27, wherein the olefin monomer is isobutene.
31. The method of claim 27, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.

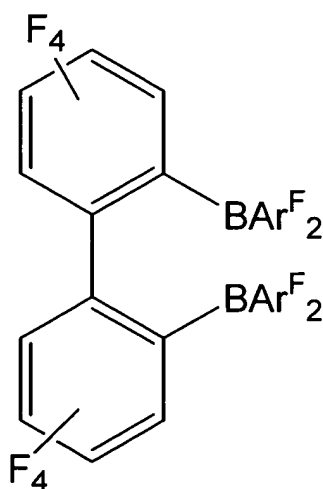
32. The method of claim 27, wherein the neat-monomer reaction phase is a liquid monomer.
33. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $\text{Ar}^{\text{F}} = \text{C}_6\text{F}_5$ or $\text{Ar}^{\text{F}}_2 = \text{C}_{12}\text{F}_8$
as a coinitiator in an organic phase or neat monomer reaction phase.

34. The method of claim 33, wherein the olefin monomer is selected from the group consisting of:
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene,
dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-
pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.
35. The method of claim 33, wherein the olefin monomer is a $\text{C}_2\text{-C}_{30}$ olefin or a $\text{C}_2\text{-C}_{30}$ diolefin.
36. The method of claim 33, wherein the olefin monomer is isobutene.

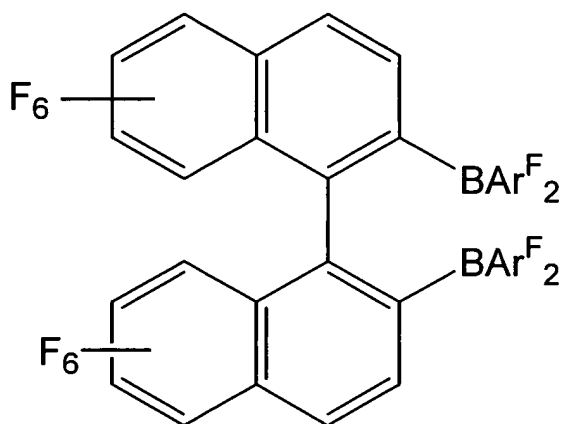
37. The method of claim 33, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.
38. The method of claim 33, wherein the neat-monomer reaction phase is a liquid monomer.
39. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $\text{Ar}^{\text{F}} = \text{C}_6\text{F}_5$ or $\text{Ar}^{\text{F}}_2 = \text{C}_{12}\text{F}_8$
as a coinitiator in an organic phase or neat monomer reaction phase.

40. The method of claim 39, wherein the olefin monomer is selected from the group consisting of:
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene,
dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

41. The method of claim 39, wherein the olefin monomer is a C₂-C₃₀ olefin or a C₂-C₃₀ diolefin.
42. The method of claim 39, wherein the olefin monomer is isobutene.
43. The method of claim 39, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.
44. The method of claim 39, wherein the neat-monomer reaction phase is a liquid monomer.
45. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:

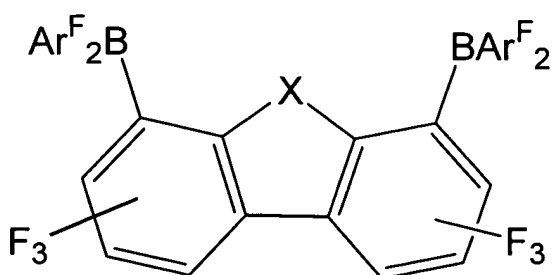


wherein $\text{Ar}^{\text{F}} = \text{C}_6\text{F}_5$ or $\text{Ar}^{\text{F}}_2 = \text{C}_{12}\text{F}_8$

as a coinitiator in an organic phase or neat monomer reaction phase.

46. The method of claim 45, wherein the olefin monomer is selected from the group consisting of:
- ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

47. The method of claim 45, wherein the olefin monomer is a C₂-C₃₀ olefin or a C₂-C₃₀ diolefin.
48. The method of claim 45, wherein the olefin monomer is isobutene.
49. The method of claim 45, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.
50. The method of claim 45, wherein the neat-monomer reaction phase is a liquid monomer.
51. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein

$X = \text{CH}_2, \text{NR}, \text{ or } \text{O}$

and

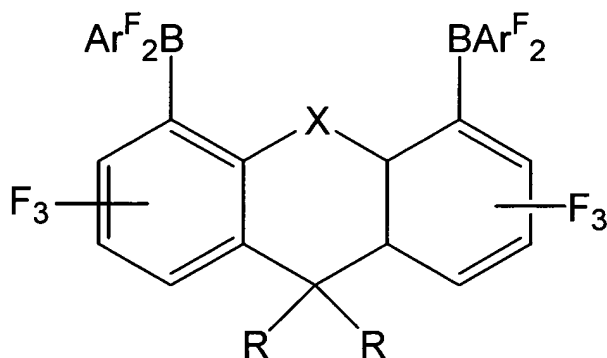
$\text{Ar}^{\text{F}} = \text{C}_6\text{F}_5 \text{ or } \text{Ar}_2^{\text{F}} = \text{C}_{12}\text{F}_8$

as a coinitiator in an organic phase or neat monomer reaction phase.

52. The method of claim 51, wherein the olefin monomer is selected from the group consisting of:

ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

53. The method of claim 51, wherein the olefin monomer is a C₂-C₃₀ olefin or a C₂-C₃₀ diolefin.
54. The method of claim 51, wherein the olefin monomer is isobutene.
55. The method of claim 51, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.
56. The method of claim 51, wherein the neat-monomer reaction phase is a liquid monomer.
57. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein

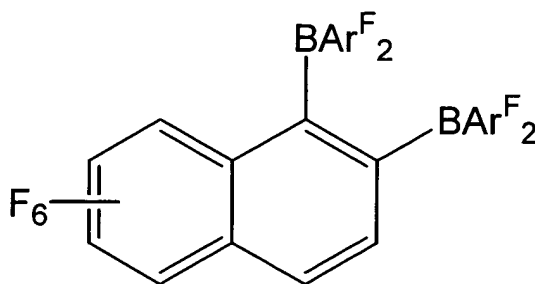
$X = \text{CH}_2, \text{NR}, \text{ or } \text{O}$

and

$\text{Ar}^F = \text{C}_6\text{F}_5 \text{ or } \text{Ar}_2^F = \text{C}_{12}\text{F}_8$

as a coinitiator in an organic phase or neat monomer reaction phase.

58. The method of claim 57, wherein the olefin monomer is selected from the group consisting of:
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene,
dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-
pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.
59. The method of claim 57, wherein the olefin monomer is a C_2 - C_{30} olefin or a C_2 - C_{30} diolefin.
60. The method of Claim 57, wherein the olefin monomer is isobutene.
61. The method of claim 57, wherein the organic phase is a hydrocarbon solution of the monomer or a
halogenated-hydrocarbon solution of the monomer.
62. The method of claim 57, wherein the neat-monomer reaction phase is a liquid monomer.
63. A method for cationically polymerizing olefin monomers comprising the step of using a composition
having the chemical structure:

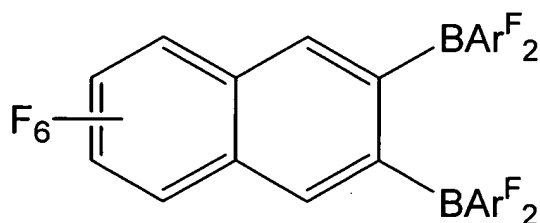


wherein $Ar^F = C_6F_5$ or $Ar^F_2 = C_{12}F_8$
as a coinitiator in an organic phase or neat monomer reaction phase.

64. The method of claim 63, wherein the olefin monomer is selected from the group consisting of:

ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

65. The method of claim 63, wherein the olefin monomer is a C_2 - C_{30} olefin or a C_2 - C_{30} diolefin.
66. The method of claim 63, wherein the olefin monomer is isobutene.
67. The method of claim 63, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.
68. The method of claim 63, wherein the neat-monomer reaction phase is a liquid monomer.
69. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein



as a coinitiator in an organic phase or neat monomer reaction phase.

70. The method of claim 69, wherein the olefin monomer is selected from the group consisting of: ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

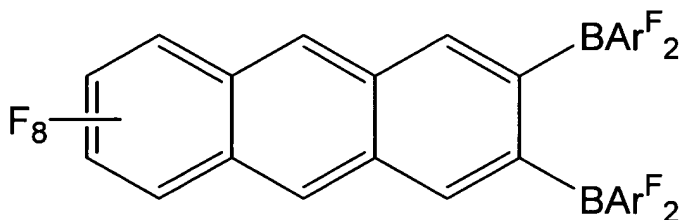
71. The method of claim 69, wherein the olefin monomer is a C₂-C₃₀ olefin or a C₂-C₃₀ diolefin.

72. The method of claim 69, wherein the olefin monomer is isobutene.

73. The method of claim 69, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.

74. The method of claim 69, wherein the neat-monomer reaction phase is a liquid monomer.

75. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $\text{Ar}^{\text{F}} = \text{C}_6\text{F}_5$ or $\text{Ar}^{\text{F}}_2 = \text{C}_{12}\text{F}_8$

as a coinitiator in an organic phase or neat monomer reaction phase.

76. The method of claim 75, wherein the olefin monomer is selected from the group consisting of: ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

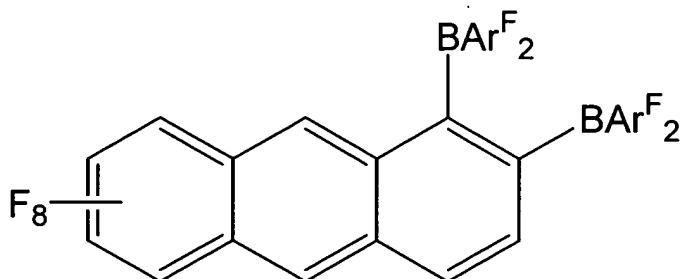
77. The method of claim 75, wherein the olefin monomer is a C₂-C₃₀ olefin or a C₂-C₃₀ diolefin.

78. The method of claim 75, wherein the olefin monomer is isobutene.

79. The method of claim 75, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.

80. The method of claim 75, wherein the neat-monomer reaction phase is a liquid monomer.

81. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $\text{Ar}^{\text{F}} = \text{C}_6\text{F}_5$ or $\text{Ar}^{\text{F}}_2 = \text{C}_{12}\text{F}_8$

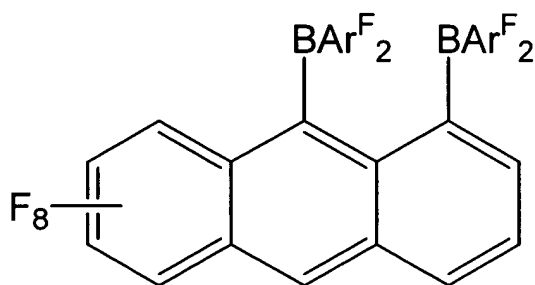
as a coinitiator in an organic phase or neat monomer reaction phase.

82. The method of claim 81, wherein the olefin monomer is selected from the group consisting of: ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

83. The method of claim 81, wherein the olefin monomer is a $\text{C}_2\text{-C}_{30}$ olefin or a $\text{C}_2\text{-C}_{30}$ diolefin.

84. The method of claim 81, wherein the olefin monomer is isobutene.

85. The method of claim 81, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.
86. The method of claim 81, wherein the neat-monomer reaction phase is a liquid monomer.
87. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



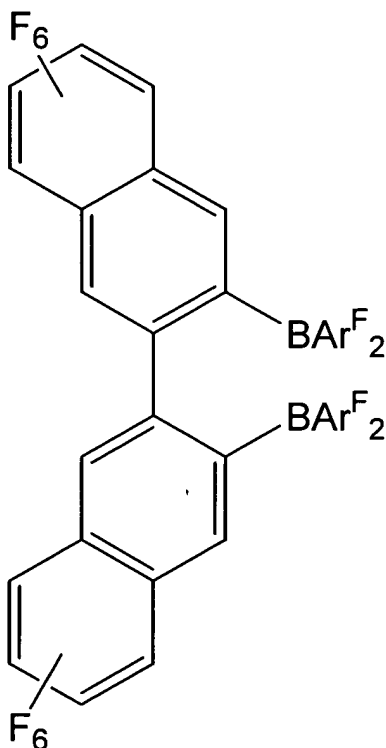
wherein



as a coinitiator in an organic phase or neat monomer reaction phase.

88. The method of claim 87, wherein the olefin monomer is selected from the group consisting of:
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.
89. The method of claim 87, wherein the olefin monomer is a C₂-C₃₀ olefin or a C₂-C₃₀ diolefin.
90. The method of claim 87, wherein the olefin monomer is isobutene.

91. The method of claim 87, wherein the organic phase is a hydrocarbon solution of the monomer or a halogenated-hydrocarbon solution of the monomer.
92. The method of claim 87, wherein the neat-monomer reaction phase is a liquid monomer.
93. A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $\text{Ar}^{\text{F}} = \text{C}_6\text{F}_5$ or $\text{Ar}^{\text{F}}_2 = \text{C}_{12}\text{F}_8$

as a coinitiator in an organic phase or neat monomer reaction phase.

94. The method of claim 93, wherein the olefin monomer is selected from the group consisting of:

ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3, 5, 5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

- 5 95. The method of claim 93, wherein the olefin monomer is a C₂-C₃₀ olefin or a C₂-C₃₀ diolefin.
96. The method of claim 93, wherein the olefin monomer is isobutene.
97. The method of claim 93, wherein the organic phase is a hydrocarbon solution of the monomer or a
10 halogenated-hydrocarbon solution of the monomer.
98. The method of claim 93, wherein the neat-monomer reaction phase is a liquid monomer.